REMARKS

This Amendment is respectfully submitted to place subject Application in condition for allowance.

Paragraphs at line 1 on page 26, line 25 on page 26, and at line 1 on page 27 of Applicants' Specification have been amended to identify original Example 5 as Comparative Example B, original Comparative Example B as Comparative Example C, and original Example 6 as Example 5. Also, the first paragraph on page 27 has been amended to correct typographical errors.

New Claims 35 to 41 have been drafted to more particularly point out and distinctly claim the novel subject matter of Applicants' invention.

In particular, new Claim 35 recites: A flow reactor comprising a plurality of walled conduits each having an outer surface disposed for contact with a heat-transfer medium, an inlet distribution manifold adapted for flow communication with an downstream manifold through channels formed by heterogeneous catalytic material disposed within each conduit during operation in a sequence of zones for catalyst having the same or different length along the longitudinal coordinate of the conduit and within each catalyst-containing zone essentially uniform cross-section of the conduit measured in a plane perpendicular to the longitudinal coordinate thereby defining volume of each catalyst-containing zone, and the sequence of catalyst-containing zones comprising at least **four** catalyst-containing zones such that each downstream catalyst-containing zone has a **larger total cross-section** than the contiguous upstream catalyst-containing zone, and wherein at least **three** of the downstream catalyst-containing zones has a **larger total volume** than the contiguous upstream catalyst-containing zone. Support for Claim 35 is found in the Specification's working examples, and original Claims 1 and 4 to 6.

New Claim 36 is directed to the flow reactor according to Claim 35, wherein the cross-section of the conduits in each catalyst-containing zone have a substantially circular form with diameter such that the third power of the diameter is equal to the product of the volume of each conduit in the zone and a geometric factor having values in a ranger from about 0.01 to about 0.50. Support for Claim 36 is found in the Specification, for example, at page 7, lines 29 to 32, and now canceled Claim 7.

New Claim 37 is directed to the flow reactor according to Claim 36, wherein the geometric factor of each downstream zone is larger than the contiguous upstream zone for the sequence of zones comprises at least three zones. Support for Claim 37 is found in the Specification's working examples, and original Claims 8.

New Claim 38 is directed to the flow reactor according to Claim 35, wherein the cross-section of the conduits in each catalyst-containing zone have a substantially circular form with diameter such that the third power of the diameter is equal to the product of the volume of each conduit in the zone and a geometric factor having values in a ranger from about 0.015 to about 0.100. Support for Claim 38 is found in the Specification's working examples, and original Claims 10.

New Claim 39 is directed to the flow reactor according to Claim 38, wherein the geometric factor of each downstream zone is larger than the contiguous upstream zone for the sequence of zones comprises at least three zones. Support for Claim 39 is found in the Specification's working examples, and original Claim 8.

New Claim 40 is directed to the flow reactor according to Claim 38, further comprises a shell adapted to maintain during operation the outer surface of each conduit predominantly in contact with a heat-transfer medium, and having an inlet in flow communication with an outlet for the heat-transfer medium.

Support for Claim 40 is found in the Specification's working examples, and original Claim 2.

New Claim 41 is directed to the flow reactor according to Claim 40, wherein cross-section and length of each zone are sized so that the heat generated during any exothermic reactions occurring inside the conduits of the zone does not exceed the amount of heat capable of being transferred to and removed by the heat transfer medium surrounding the conduits. Support for Claim 417 is found in the Specification's working examples, and original Claims 3.

Claim Rejections - 35 U.S.C. § 103(a)

In outstanding Office Action, Claims 1 to 6, 8 to 11, 33, and 34 were rejected under 35 U.S.C. § 103(a) as being unpatentable over DE29 29 300. Applicants respectfully traverse these rejections.

Several Figures in DE 29 29 300 suggest an unorganized variety of proposed flow reactors comprised of a plurality of conduits having changing catalyst bed diameter. For example, in Figure 3 conduits having larger downstream diameters and conduits having smaller downstream diameters are both included in the same shell. Figures 1, 2 and 4, downstream diameters are both decreased and increased. Likewise, DE29 29 300 suggest no particular requirements for volume of downstream beds.

By contrast Claim 35 recites a sequence of catalyst-containing zones comprising at least **four** catalyst-containing zones such that each downstream catalyst-containing zone has a **larger total cross-section** than the contiguous upstream catalyst-containing zone, and wherein at least **three** of the downstream catalyst-containing zones has a **larger total volume** than the contiguous upstream zone.

Attention of Primary Examiner Kerns is invited to contrast results of Applicants' Comparative Example A, (a cylindrical

reference reactor having a uniform cross-section) and Comparative Example B (four contiguous cylindrical zones as shown in Table V which perhaps are suggested by Figure 1 in DE 29 29 300 as relied upon by Examiner).

In Comparative Example A, the temperature profile of the catalyst bed along the axial co-ordinate exhibited a maximum of 471° C which was 52°C higher than the molten salt temperature of 419° C. In Comparative Example B (originally Example 5), the temperature profile of the catalyst bed along the axial co-ordinate exhibited a maximum of 471° C which was 87°C higher than the molten salt temperature of 384° C. The catalyst bed having a uniform cross-section gave better "hot spot" results.

It is the position of Applicants that instant Claims 1 to 6, 8 to 11, 33, and 34 to 41, inclusive, meet all requirements under 35 U.S.C. § 103(a).

Affidavit under Rule 1.132

An affidavit under Rule 1.132 of Dr. HASSAN TAHERI on the 19th day of October, 2005, is hereby presented to further the prosecution of subject Application. In particular, the affidavit of Dr. Taheri supports instant Claims 1 to 6, 8 to 11, 33, and 34 to 41, inclusive, which are directed to Applicants' novel invention as described in the specification and original claims of subject application.

In 1969 Dr. Taheri received a Bachelor of Science degree in Chemical Engineering from the Texas A & M University, and a Master of Science degree in Chemical Engineering in 1972 from Princeton University, Princeton. In May, 1975 he received a Doctor of Philosophy Chemical Engineering also from Princeton University. His dissertation research was a study of hydrogenolysis and isomerization of n-pentane over copper-nickel catalyst.

From July 1975 to the present, Dr. Taheri has been employed by BP America Inc. and BP Chemicals, and has the position of Associate Research Engineer. He states that he has read the Office Action from Examiner Kerns, mailed May 9, 2005, and the references relied upon to reject our claims, and respectfully submits that the Examiner's statement failed to identify critical elements of DE29 29 300 teachings that are contrary to Applicants' novel invention.

The Linde AG reference of record describes three catalytic reactors characterized by the fact that the cross-section of the catalyst-containing pipes are varied along the direction of flow for three zones in Figures 2 and 3; and four zones in Figure 1. However, in none of these figures relied upon by Examiner do each and every downstream zone have a larger cross-section than the contiguous upstream zone.

By contrast Applicants' novel flow reactors comprises, as now recited in new Claim 35, a sequence of catalyst-containing zones comprising at least four catalyst-containing zones such that each downstream catalyst-containing zone has a larger cross-section than the contiguous upstream catalyst-containing zone, and wherein at least three of the downstream catalyst-containing zones has a larger volume than the contiguous upstream catalyst-containing zone.

Dr. Taheri provided experimental examples that reveal effects of the differences between Applicants' novel apparatus illustrated, for example, in Figure 2 of subject application, and the Linde apparatus illustrated in Figures 1, 2, and 3 of German Patent Number: 29 29 300.

Dr. Taheri states that it is his professional opinion that his experiments and observations demonstrate that in flow reactors according to the invention, where the cross-section of the conduits

in each catalyst-containing zone have a substantially circular form, having diameter such that the third power of the diameter is equal to the product of the volume of each conduit in the zone and a geometric factor having values in a ranger from about 0.01 to about 0.50 is critical to effect both higher maleic anhydride yield and control of maximum temperature difference between catalyst and molten salt bath.

In particular, his results demonstrate a preferred embodiment of Applicants novel flow reactors having four zones with geometric factors of 0.269, 0.227, 0.277 and 0.749, the maleic anhydride yield was 96 percent by weight and a maximum of catalyst which is only 33 degrees higher than the molten salt temperature. These results have been neither disclosed nor suggested by any references of record alone or in the combinations of Examiner. By contrast, a reactor catalyst bed using four contiguous cylindrical zones as shown in Figure 1 of the Linde AG reference of record, provided no better results than the 77 percent I observed using the cylindrical reference reactor having a uniform ID of 1 in.

Applicants and their undersigned Attorney appreciate Examiner's attention to the arguments of Dr. Taheri in further consideration of this matter.

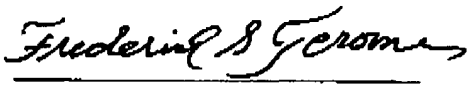
Base on the amendments submitted herein and in an affidavit under 37 CFR § 1.132, Applicants urge that instant Claims 1 to 6, 8 to 11, 33, and 34 to 41, inclusive, all claims now presented, are in condition for allowance. Applicants respectfully request Primary Examiner Kerns to pass subject application for allowance.

Do not hesitate to contact Frederick S. Jerome whose telephone number is (630) 832-7974 (FAX (630) 832-7976) if additional assistance is needed regarding this paper or earlier papers for Applicants.

09/920,981 filed 08/02/2001 Art Unit 1764
Response to Notice of Non-Compliant Amendment dated 12/12/2005

Applicants and their undersigned Attorney appreciate Examiner's attention and further consideration of this matter.

Respectfully submitted,



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